Central Valley Steelhead

Draft Preliminary Example Biological Goals, Objectives, and Stressors for the BDCP

February 27th, 2012

Global Goals

Removal of the CV Steelhead DPS from the Federal List of Endangered and Threatened Wildlife (NMFS 2009). According to the NMFS draft recovery plan (2009), recovery and long-term sustainability requires:

1) Adequate protection for replacement of losses due to natural mortality (disease and stochastic events)
2) Sufficient genetic robustness to avoid inbreeding depression and allow for adaptation
3) Sufficient habitat (type, amount, and quality) for long-term population maintenance
4) Elimination or control of threats

Global Objectives

There are two components of Global Objectives that are relevant to the BDCP program. The first pertains to Recovery Plan goals based on Viable Salmonid Population (VSP) criteria, and further refined for the Central Valley in Lindley et al. (2007). The second component relates to Critical Habitat (as designated for CV Steelhead 70 FR 52488 on September 2, 2005)

Global VSP Objectives include:

VSP1. Increase abundance

VSP2. Increase spatial distribution

a. Secure all extant populations (all populations are important because there are so many "missing" populations in the Central Valley)

b. Recover populations in each diversity group

VSP3. Protect and increase life history and genetic diversity

VSP4. Increase productivity (population growth rate = births-deaths)

Viable populations should demonstrate a combination of population growth rate and abundance that produces an acceptable probability of population persistence (NMFS Draft Recovery Plan).

Global Critical Habitat Objectives (from primary constituent elements)

CH1. Provide freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development;

CH2. Provide freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii)Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

CH3. Provide freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

CH4. Provide estuarine areas free of obstruction and excessive predation with:
(i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and
(iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

CV STEELHEAD – GLOBAL **ABUNDANCE** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Increase Central Valley steelhead abundance	1. Attainment of the CV steelhead global abundance goal will occur with achievement of 6-year geometric mean escapement levels of: 11,000 naturally produced adult steelhead in the Sacramento River and its tributaries, with no year below 5,000; and 1,700 in the San Joaquin River and its tributaries, with no year below 800. These numbers do not include hatchery produced steelhead.	Improved juvenile survival (as a proxy for abundance) within the Plan Area, SF Bay, and the nearshore ocean.	Increase current survival rate of juvenile emigrants from Sac and SJ River system through Delta, SF Bay, and into nearshore ocean[1].	Entrainment	Reduce entrainment of steelhead by at least 50% in all water year types	-Water Ops -Alternate migration routes
				Predation	-Decrease mortality from predation in (specify locations & months) by __%. -Maintain minimum Delta inflows in key migratory months, and increase holding habitat	-Predator removal -Water Ops
				Poor Migratory Habitat	Increase quantity and quality of migratory habitat (including floodplain, channel margin, and riparian habitats) throughout the Delta for successful juvenile emigration	-Yolo bypass -SJR bypass -Suisun -Ammonia
				North Delta Diversion Facilities	Maintain survival rates through the reach containing new north Delta diversions to no more than a 2% loss per screen, and no more than a 5% cumulative loss.	-Water Ops -Alternate migration routes -Predator removal
				Migration Flows	Maintain minimum Delta inflows in key migratory months	-Water Ops
		Increase migration/ spawning success of adult steelhead migrating through the Delta,	Eliminate human-induced passage delays or illegal take of steelhead adults in the Delta.	Migration barriers	Eliminate known human-caused passage impediments (chemical and physical) in the Plan Area	-Fremont weir -SDWSC
				Poaching	Eliminate steelhead poaching in the Delta	-Funding for game wardens

[1]The exact survival rate is TBD, but would be high enough to allow for positive population growth rates.

CV STEELHEAD – GLOBAL **SPATIAL DISTRIBUTION** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Increase spatial distribution of Central Valley steelhead a. Secure all extant populations (all populations are important because there are so many "missing" populations in the Central Valley) b. Recover populations in each diversity group	Attainment of the CV steelhead global spatial distribution goal will occur with restoration of eight self-sustaining, independent populations of naturally produced steelhead in watersheds of the Sacramento River drainage, broken down by region: One viable population in the Northwestern CA Region (Clear Crk to Stony Crk); Two viable populations in Basalt & Porous Lava Region (Little Sac R. to Battle Crk); Five viable populations in Northern Sierra Region (Antelope Crk to Mokelumne R.); and Two self-sustaining, independent populations in watersheds of the San Joaquin River drainage (roughly the Southern Sierra Region)	Improved adult and juvenile migration success through the Delta to and from the SJ River and Sac. River Basins (as a proxy for spatial distribution)	Eliminate human-induced adult passage delays (barriers that necessitate median passage time > 36 hrs.)	Migration barriers –Sac. River	Eliminate known human-caused passage physical impediments (physical) within Plan Area	-Fremont weir
				Migration barriers – SJ River	Eliminate known human-caused passage impediments (chemical) within Plan Area	-SDWSC
				Attraction flows	Provide Delta inflows > __cfs (Sac River) and >___cfs (SJ River), between __date__ & __date__.	Water Ops
			Create one juvenile migration pathway in the lower SJ River in all years, within one year of implementation, and create a second pathway on the SJ River ---------- Create one alternate migratory path on the lower Sac. River in > 40% of years.	Entrainment	Maintain SJ River steelhead entrainment at project pumps to < X% of estimated smolt production in all water year types.	-Water Ops -SJR flood bypass
				Limited juvenile emigration routes (SJ River)	Provide juvenile migration flows scaled to unimpaired hydrology (see Table __) on lower SJR & eliminate low DO barrier between [date] & [date].	-Water Ops -SDWSC
				Limited juvenile emigration routes (SJ River)	Ensure that at least __ % of juvenile SJR steelhead emigrate through a non-mainstem channel route (flood bypass) in at least 30% of years.	-SJ River flood bypass
				Limited juvenile emigration routes (Sac. River)	Ensure that at least __ % of juvenile Sacramento steelhead emigrate through a non-mainstem channel route (e.g. flood bypass) in at least 40% of years.	-Yolo bypass -Fremont weir

CV STEELHEAD – GLOBAL **LIFE-HISTORY AND GENETIC DIVERSITY** GOAL LOGIC TREE						
Global Goal	**Global Objectives**	**BDCP Goal**	**BDCP Objective**	**Assumed Stressor**	**Stressor Reduction Target**	**Cons. Measures**
Protect and increase life-history and genetic diversity of Central Valley steelhead	Attainment of the CV steelhead global life-history diversity goal will occur with restoration of eight self-sustaining, independent populations of naturally produced steelhead in the Sacramento River drainage, broken down by region: One viable population in the Northwestern CA Region (Clear Crk to Stony Crk); Two viable populations in Basalt & Porous Lava Region (Little Sac R. to Battle Crk); Five viable populations in Northern Sierra Region (Antelope Crk to Mokelumne R.); and	Protect and restore full range of adult and juvenile life-history types migrating through the Delta by ensuring that the project does not favor the survival of one life-history type over others	Eliminate artificial selection for or against steelhead life-history types resulting from project operations (including hatcheries)	Hatchery Effects	Alter hatchery practices to minimize adverse changes to life-history traits of wild steelhead resulting from hatchery operations (e.g., domestication selection, loss of genetic diversity, run timing)	-Hatchery reform
				Hatchery Effects	Alter hatchery practices to minimize adverse changes in life-history traits of hatchery steelhead resulting from hatchery operations (e.g., domestication selection, loss of genetic diversity, run timing)	-Hatchery reform
				Entrainment	Ensure that entrainment does not favor the survival of one life-history type over other types (e.g., early or late migrating smolts or adults)	-Water Ops
				Flow Magnitude and Timing	To an equal degree across steelhead life-history types (e.g., size/age at smolting, age at maturity, migration timing) provide flows that support rearing and migration in all times and places where they occur (these will vary temporally and spatially).	-Water Ops (including upstream) -SJ River
				Rearing Habitat	Steelhead in both Sacramento and San Joaquin Rivers will have access to inundated floodplains > 45d in at least 1 of 3yrs	-Yolo Bypass -SJ River floodplain

	Two self-sustaining, independent populations in the San Joaquin River drainage (roughly the Southern Sierra Region)					